What is claimed is:

1. An apparatus for image processing, the apparatus comprising:

an image sensor circuit, wherein the image sensor circuit is configured to selectively provide a captured image; and

an image processing and control block that is arranged to provide a denoised image, wherein the image processing and control block includes a memory, and wherein the image processing and control block is configured to:

adjust a stored image according to a selected gain setting to provide an adjusted image, wherein the stored image is related to the captured image,

perform a wavelet transformation on the adjusted image such that the adjusted image is decomposed into a plurality of sub-bands,

select a set of threshold parameters from a gain-threshold map in response to the selected gain setting, wherein the gain-threshold map is stored in the memory and organized as a lookup table that maps a plurality of gain settings to a corresponding set of predetermined approximately optimal threshold parameters for each sub-band;

threshold each of the plurality of sub-bands according to the selected set of threshold parameters to provide thresholded sub-bands; and

perform an inverse wavelet transformation on the thresholded sub-bands to provide the denoised image.

2. The apparatus of Claim 1,

wherein the image sensor circuit comprises:

an image sensor that includes a plurality of pixel sensors that are organized into rows and columns, wherein the image sensor is configured to selectively provide the captured image as a plurality of pixel output signals;

a row control logic block that is configured to select at least one row of the image sensor in response to a row control signal;

a column control logic block that is configured to select at least one column of the image sensor in response to a column control signal;

a column amplifier block that is configured to provide a raw analog signal in response to pixel output signals;

a front end processing block that is configured to perform gain and offset correction on the raw analog signal to provide a processed analog signal; and

wherein the image processing and control block is further arranged to:

provide row and column control signals,

convert the processed analog signal into a digitized image,

store the digitized image to provide the stored image, and

apply correction to the stored image at a plurality of predetermined pixel locations that are associated with bad pixels in the image sensor.

3. The apparatus of Claim 1, wherein the image processing and control block is further configured to adjust the stored image by selecting gain settings for each color plane in a color image and adjusting the stored image with the selected gain settings such that the adjusted image is white balanced; and wherein the image processing and control block is further configured to select the set of threshold parameters, where separate threshold parameters are provided for each color plane associated with the adjusted image.

4. The apparatus of Claim 1, wherein the wavelet transformation is one of a Haar wavelet transformation, a Daubechies wavelet transformation, and a Symmlet wavelet transformation.

5. The apparatus of Claim 1, wherein the image processing and control block is configured for at least one of: manual selection of the gain setting by user interaction, and automatic selection of the gain setting for the apparatus in response to a luminance that is associated with stored image.

6. The apparatus of Claim 1, wherein each set of predetermined approximately optimal threshold parameters comprises a plurality of threshold percentages, each of the plurality of threshold percentages is associated with an associated sub-band, thresholding each of the plurality comprises thresholding each sub-band of the plurality of sub-bands according to the threshold percentage for the associated sub-band, and wherein the threshold percentage corresponds to a percentage of wavelet coefficients of the associated sub-band that will be set to approximately zero when the plurality of sub-bands are thresholded.

7. The apparatus of Claim 1, further comprising a means for constructing that is configured to construct the gain-threshold map.

8. The apparatus as in Claim 7, wherein the means for constructing comprises:

a first means for acquiring that is configured to acquire a reference image;

a first means for storing that is configured store to the reference image;

a second means for acquiring that is configured acquire to a test image;

a second means for storing that is configured to store the test image;

a means for adjusting that is configured to adjust the test image according to a gain setting to provide another adjusted image, wherein the gain setting is related to a luminance that is associated with test image;

a means for applying that is configured to apply a wavelet transformation to the other adjusted image to provide a test plurality of sub-bands;

a means for providing that is configured to select one sub-band of the test plurality of sub-bands, and further configured to provide a plurality of test output images by, for the selected sub-band:

applying the selected threshold parameter to provide a filtered sub-band, and

applying an inverse wavelet transformation using the filtered sub-band and also using the non-selected sub-bands to provide one of the plurality of test output images; and

a means for linking that is configured to link the gain setting to an approximately optimal set of threshold parameters for each sub-band, wherein the optimal set of threshold parameters is determined based upon on analysis of each of the plurality of test output images.

9. A method for image processing, the method comprising:

adjusting a stored image according to a selected gain setting to provide an adjusted image;

performing a wavelet transformation on the adjusted image such that the adjusted image is decomposed into a plurality of sub-bands;

selecting a set of threshold parameters from a gain-threshold map in response to the selected gain setting, wherein the gain-threshold map is stored in the memory and organized as a lookup table that maps a plurality of gain settings to a corresponding set of predetermined approximately optimal threshold parameters for each sub-band;

thresholding each of the plurality of sub-bands according to the selected set of threshold parameters to provide thresholded sub-bands; and

performing an inverse wavelet transformation on the thresholded sub-bands to provide the denoised image.

10. A method for determining wavelet sub-band threshold parameters, the method comprising:

acquiring a reference image;

storing the reference image;

acquiring a test image;

storing the test image;

adjusting the test image according to a gain setting to provide an adjusted image, wherein the gain setting is related to a luminance that is associated with the test image;

applying a wavelet transformation to the adjusted image to provide a plurality of sub-bands;

selecting one of the plurality of sub-bands as the selected sub-band; and

for the selected sub-band:

selecting one threshold parameter of the set of threshold parameters as the selected threshold parameter,

applying the selected threshold parameter to provide a filtered sub-band, and

applying an inverse wavelet transformation using the filtered sub-band and also using the non-selected sub-bands to provide one of the plurality of test output images.

11. The method of claim 10, further comprising selecting each of the plurality of sub-bands in turn as the selected sub-band.

12. The method of Claim 10, the method further comprising white-balancing the reference image such that each color channel has a different gain setting.

13. The method of Claim 10, further comprising correcting the reference image and the test image, wherein:

receiving the reference image is accomplished under good lighting conditions; and

wherein correcting the reference image and the test image comprises:

receiving a dark image,

evaluating the dark image to determine which pixel locations corresponds to bad pixel locations,

storing the bad pixel locations, and

correcting a pixel value at each bad pixel location in the reference image.

14. The method of Claim 10, further comprising constructing a gain-threshold map, wherein constructing the gain-threshold map comprises linking the gain setting to an approximately optimal set of threshold parameters for each sub-band, wherein the optimal set of threshold parameters is determined based upon on analysis of each of the plurality of test output images.

15. The method of Claim 10, wherein the gain setting is selected such that a one of a mean pixel value and a maximum pixel value of the adjusted image corresponds to the one of the mean pixel value and the maximum pixel value of the reference image.

16. The method of Claim 10, wherein the test image comprises one of an entire image and a subset of the entire image.

17. The method of Claim 10, wherein the wavelet transformation comprises a three-level Haar wavelet transformation such that the number of the plurality of sub-bands is ten.

18. The method of Claim 10 further comprising testing each of the following parameters: wavelet filter type, wavelet filter length, the number of wavelet decomposition levels, and the thresholding type.

19. The method of Claim 14, further comprising:

scaling a stored image according to a selected gain setting to provide an scaled image;

performing a wavelet transformation on the scaled image, such that the scaled image is decomposed into another plurality of sub-bands;

selecting a set of threshold parameters from the gain-threshold map in response to the selected gain setting;

thresholding each sub-band of the other plurality of sub-bands according to the selected set of threshold parameters to provide thresholded sub-bands; and

performing an inverse wavelet transformation on the thresholded sub-bands to provide a denoised image.

20. The method of Claim 10, wherein the set of threshold parameters comprises a set of threshold percentages, and wherein each threshold percentage of the set of threshold percentages corresponds to a percentage of wavelet coefficients of the selected sub-band that will be set to approximately zero when the threshold percentage is applied to the selected sub-band.